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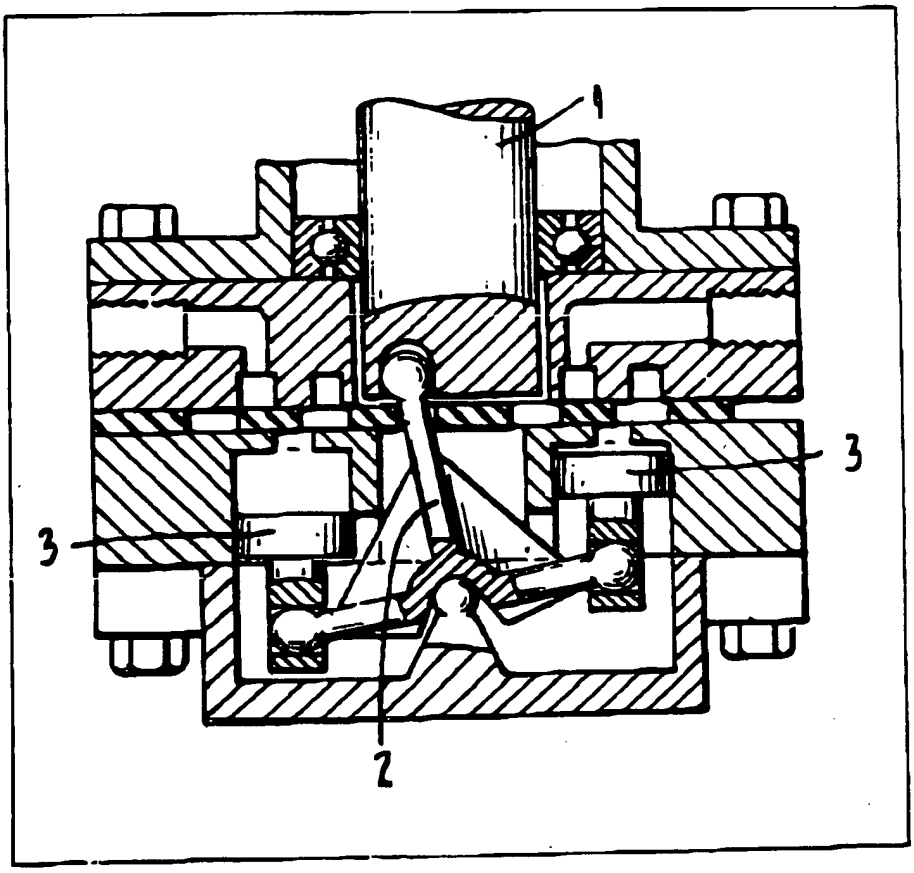
(54) Wobbler type cranking system

(57) Rotary motion of a shaft 1 is converted into linear reciprocating motion of pistons 3, or vice-versa, by means of a multiple bell crank lever 2 comprising two or more first arms connected at a fulcrum and radiating in a plane and a single second arm connected to the first arms at said fulcrum and extending along a radius perpendicular to said plane.



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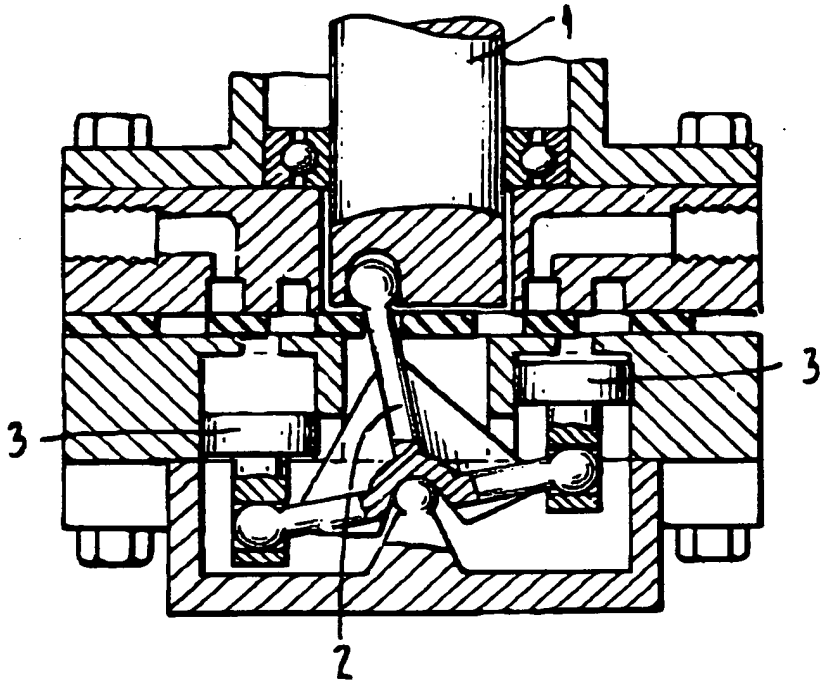

SPECIFICATION

Cranking systems

The present invention relates to cranking systems for converting rotary motion to linear reciprocating motion and vice-versa.

There are many fields in mechanics which involve the conversion of rotary motion to linear reciprocating motion and vice versa. Such fields include hydraulic motors, various pumps and internal combustion engines. Such mechanisms for the conversion of the one form of motion to the other often involve a number of components such as cam mechanisms, crank shafts and connecting rods. An object of the present invention is to provide a simple cranking system for the conversion of the one form of motion to the other which is capable of eliminating some or all of the components used in the motion conversion mechanisms of the prior art.

According to the present invention there is provided a cranking system for converting rotary motion to linear reciprocating motion or vice versa comprising a multiple bell crank lever (as herein defined) so arranged that the fulcrum is located, by means of a pivotal connection, on the housing for two or more reciprocating members, or on a member rigidly connected to said housing, the ends of the first radiating arms being pivotally connected to respective reciprocating members, the end of the remaining, second arms being pivotally connected to a rotating member at a position on the plane of rotation of said rotating member eccentric to the axis of rotation thereof.

A multiple bell crank lever is defined as consisting of two or more first arms connected at a central fulcrum point and radiating substantially in the same plane from said fulcrum point, and a single second arm connected to said first arms at said fulcrum point and extending therefrom along a radius substantially at right angles to the plane of said first radiating arms. Thus it will be appreciated that the single second arm and each of the first radiating arms form a bell crank lever.

An embodiment of the invention will now be described, by way of example, with reference to the single Figure of the accompanying drawings, which shows a side view, mainly in section, through a cranking system according to the invention.

Referring to the drawing there is shown a cranking system for converting rotary motion of a shaft 1, by means of a multiple bell crank lever 2, into double acting linear reciprocating motion of a pair of pistons 3.

It will be apparent that other systems may be designed incorporating a multiple bell crank lever with three or more first radiating arms. In such multiple throw systems the crank may drive, or be driven by, a rotating shaft thus allowing the unit to be used as a motor or load sensitive torque converter.

A multiple throw crank married to an in-line block, the cylinders arranged in a circular pattern, will give a constant and progressive torque output. If a slide is introduced to alter the degree of eccentricity of the cam, then the output torque may be infinitely variable. Further variations may be made in swept volume, pressures, strokes, cylinder diameter and cylinder position which may result in many different functions being possible within one pump/motor/valve system.

It will be apparent to a person skilled in the art that the present invention provides many advantages and economies compared to prior systems. Such advantages can be illustrated by comparing a conventional in-line swash plate hydraulic motor, as standard, and with the substitution of this component. The component replaces the following parts: rotating cylinder block, piston shoe, shoe retainer plate, swash plate and eliminates the need for large area low friction bearing faces and piston sheer forces that must be contended with. Material savings are obvious from the reduced component list, and there are further savings in machining time and tolerancing. As this component does not rotate but oscillates, there is a proportional reduction in wear and so an increase in service life.

CLAIMS

1. A cranking system for converting rotary motion to linear reciprocating motion or vice versa comprising a multiple bell crank lever (as herein defined) so arranged that the fulcrum is located, by means of a pivotal connection, on the housing for two or more reciprocating members, or on a member rigidly connected to said housing, the ends of the first radiating arms being pivotally connected to respective reciprocating members, the end of the remaining, second arm being pivotally connected to a rotating member at a position on the plane of rotation of said rotating member eccentric to the axis of rotation thereof.

2. A system according to claim 1 wherein said multiple bell crank is married to an in-line cylinder block with the cylinders arranged in a circular pattern.

3. A system according to claim 1 or claim 2 in the form of a motor wherein said multiple bell crank operates to drive a rotating member.

4. An hydraulic pump incorporating a system according to any one of claims 1 to 3.

5. An hydraulic motor incorporating a system according to any one of claims 1 to 4.

6. An internal combustion engine incorporating a system as claimed in any one of claims 1 to 4.

7. A cranking system substantially as herein described with reference to the accompanying drawing.

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The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.